REMARKS

Reconsideration and further examination of the application as amended are requested. All rejections and objections are respectfully traversed.

The Office Action objected to the Abstract for including claim-type language, such as "means" and "comprising". Applicant has amended the Abstract. Applicant submits that the Abstract, as amended, addresses the concerns raised in the Office Action.

The Office Action also rejected claims 1 and 4-11 under 35 U.S.C. §103(a) as being obvious over U. S. Patent No. 4,446,874 to Vaguine ("Vaguine") in view of U. S. Patent No. 3,461,261 to Lewis *et al.* ("Lewis"); and claims 2-3 under 35 U.S.C. §103(a) as obvious over Vaguine in view of Lewis and further in view of U. S. Patent No. 3,065,752 to Potzl.

Amendments to the Claims

The claims have been amended to more clearly define the invention and to correct minor typographical errors. No new matter is introduced.

Summary of the Present Invention

The present invention provides a microwave applicator for treating biological tissue with radiation in the TM_{01} mode. The independent claims recite a coaxial electrical input with an inner conductor extending longitudinally within one end of the waveguide to launch microwaves in the TM_{01} mode to the distal end of the waveguide and into biological tissue.

Distinctions between the Present Invention and the Cited References

Vaguine discloses several frequency-tunable therapeutic applicators (col. 3, lines

3-32). Vaguine's applicators incorporate a metal loop for exciting operation in the TE_{01} or TE_{11} mode (col. 6, lines 50-54).

Lewis describes a microwave heater. The microwave heater is resonant in the TM_{01} mode and heats materials axially disposed in a cavity.

In rejecting claim 1, the Office Action contends that it would be obvious to launch microwaves in the TM_{01} mode from Vaguine's applicators, based on Lewis' disclosure of a microwave heater operating in the TM_{01} mode. Applicant respectfully disagrees.

First, Applicant notes that changing a microwave applicator from operating in an electric resonance mode to a magnetic resonance mode is by no means a simple matter, as is suggested by the Office Action. Microwave applicators are often designed to operate in a particular resonance mode. Figures 2 and 3 of Lewis demonstrate the substantial difference between magnetic and electric resonance modes. Vaguine describes a rectangular waveguide that operates in the TE_{01} mode, and a cylindrical waveguide that operates in the TE_{11} mode. Both of these modes are electric (not magnetic) resonance modes. Vaguine makes no mention at all of magnetic modes.

Second, Applicant believes that Vaguine's applicators, due to the disclosed structure, are not capable of operating in the TM_{01} mode. Specifically, Vaguine discloses a loop soldered to an inner conductor of a coaxial cable (FIG. 4), which excites transverse electric modes. "A metal loop 102 . . . is always located in the maxiumum magnetic fieldof the waveguide 40 for the fundamental mode. . .The fundamental mode of operation is the TE_{01} mode. . . The metal loop 102 is positioned along the central axis of the waveguide 40 to prevent excitation of undesirable TE_{02} modes and to excite the TE_{01} mode by its location at maximum magnetic field intensity." (col. 6, lines 44-54)

Accordingly, based on the design selected by Vaguine, that reference actually teaches away from the use of a magnetic mode of resonance, as recited in the present invention.

Furthermore, Lewis' microwave heater is not even designed to deliver radiation to the distal end of the cavity for transmission outside, but rather to heat a material passing through the cavity. Lewis discloses three reasons for operating the heater in a transverse magnetic mode: (1) "to maintain a concentrated axial electric energy propagation" (col. 3, lines 33-35); (2) because the "cavity resonance. . . is attainable over relatively long cavity lengths" (col. 4, lines 73-75); and (3) because it "requires the smallest diameter of cavity for resonance" (col. 5, lines 3-5).

Furthermore, the references fail to demonstrate other features recited in the claims. In Vaguine's device, the inner conductor extends obliquely (FIG. 4) whereas claim 1 recites "an inner conductor of the coaxial input extending longitudinally within one end of the waveguide."

Claim 9 further recites a lateral diaphragm in the waveguide. Neither of the references mentions such a diaphragm at all.

In sum, the references cited do not teach or suggest the microwave applicator set forth in the independent claims.

Applicant submits that all claims are now in condition for allowance and early favorable action is requested.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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